SITING AND WETLAND 404(b)1 ALTERNATIVES ANALYSIS

BP CHERRY POINT COGENERATION PROJECT

[REVISED]

Prepared for:

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1. INTRODUCTION

This comprehensive alternatives analysis is prepared to meet EFSEC and SEPA requirements to identify and discuss alternative site locations and to satisfy the United States Army Corps of Engineers ("Corps") Section 404 (b)1 wetland alternatives requirement.

The alternatives analysis consists of five sections including this Section 1: Introduction. Section 2 describes the purpose and need of the project. Section 3 addresses the action and no action alternatives, including the alternative site locations, construction laydown sites, and alternative configurations on the selected site. Section 4 describes the mitigation goal and objectives. A mitigation plan has been prepared for the project. Section 5 presents reference information.

2. PURPOSE AND NEED

2.1 Proposed Action

BP West Coast Products, LLC (BP) is proposing to build a 720-megawatt (MW) natural gas-fired combined-cycle combustion turbine cogeneration facility (Cogeneration Project) on BP owned-land adjacent to the BP Cherry Point Refinery (Refinery). The Cogeneration Project site, laydown areas, and access roads total approximately 69 acres of land. This land is owned by BP and represents less than 3% of the approximately 2,500 acres BP owns at Cherry Point.

The Project site is located in an area zoned by Whatcom County as Heavy Impact Industrial on Cherry Point, approximately 15 miles north of Bellingham and 7 miles south of Blaine, Washington. Grandview Road (SR 548) provides the main vehicle access to the Cogeneration Project site and the Refinery. Grandview Road intersects Interstate-5 (I-5) approximately 5 miles to the east of the site. A Burlington Northern-Santa Fe (BNSF) railway line borders the eastern edge of the Refinery property.

The Project site is relatively flat with no dominant topographical features. The Cogeneration Project site is located on approximately 33 acres of unimproved land (See Figure 1-1, Vicinity Map), and the construction laydown (staging and assembly) areas and access roads will be located on approximately 36 acres. The project facility, ancillary facilities and construction laydown areas will impact approximately 35.37-acres of wetlands (See Figure 1-2, Impacted Wetlands within Study Area).

The most notable topographic features in the vicinity of the project include Terrell Creek, Point Whitehorn, and Birch Bay. Approximately 0.5-mile north of the site Terrell Creek flows through a wooded area and creates a narrow ravine as it drains westerly into Birch Bay. Point Whitehorn is a high bluff approximately 1.5-miles to the west of the site that overlooks Birch Bay, which is part of the coastline along the Strait of Georgia.

Natural gas will be delivered to the Cogeneration Project through a proprietary natural gas pipeline that currently provides gas to the Refinery. A gas compressor station will be constructed at the Project site to increase pipeline delivery pressure. If needed, additional gas will be obtained from other third-party pipelines. All other infrastructure is available at the Refinery, including water supply and a wastewater treatment system. Stormwater will be directed from the site to a detention area south of Grandview Road and then dispersed into a wetland mitigation area north of Grandview Road.

The Cogeneration Project will generate a nominal 720 megawatts (MW) of electric power and export approximately 85-MW of power directly to the Refinery and will also supply intermediate-pressure steam to the Refinery. The Refinery will return hot condensate to the Cogeneration Project. Major components related to the power generation plant are:

- Combustion turbine generators (3),
- Heat recovery steam generators (3),

- Steam turbine (1),
- Steam turbine electrical generator (1),
- Cooling tower (1)
- Electrical switchyard, with a connection to the Refinery and BPA transmission system
- 230-kV transmission line
- Natural gas compressor station

The power generated, net of Refinery consumption, would be exported via a new 230-kV transmission line that will connect the power plant to an existing 230-kV Bonneville Power Administration transmission line (See Figure 1-3, Project Site Plan). A new 230 kV transmission line approximately 0.8 miles long will be located entirely on BP property.

Wetland impacts related to construction of the transmission line were permitted previously. Wetland mitigation for the impacts of the transmission line has been constructed on the BP property, north of Grandview Road. Proposed mitigation for wetland impacts due to the Cogeneration Project would occur in the same general area, creating contiguous enhanced wetland habitat. A proposed mitigation plan for the Cogeneration Project has been prepared under a separate cover.

This alternatives analysis, as required by Section 404(b)(1) of the Clean Water Act, evaluates alternative locations and configurations for the generating facility and the construction laydown areas. Impacts related to the transmission line will not be addressed since they were subject to a previous permit action and mitigation.

2.2 Purpose and Need

The purpose and need for the project are as follows:

- To provide reliable, efficient and cost-effective steam and electrical power to the Refinery.
- To provide efficient and cost-effective electrical power to the region.
- To minimize the Refinery's reliance on outside sources for electricity.
- To minimize impacts to the environment.

These key points are discussed in more detail below.

2.2.1 Efficient and Reliable Energy

The Refinery operations require approximately 85 MW of electricity. Historically, BP has relied on electricity purchased from third parties and steam generated by on-site boilers. However, the Refinery’s reliance on third party sources for electricity has exposed the Refinery to the extreme volatility in the electricity markets. Cogeneration is considered one of the most efficient and reliable methods of electricity generation. Fuels such as natural gas,

coal, oil and solid fuels such as wood waste, municipal waste or petroleum coke can be used for cogeneration facilities. However, because a proprietary natural gas pipeline currently supplies the Refinery, and the other solid fuels would have greater environmental impacts and poorer reliability, BP chose a natural gas-fired cogeneration facility.

For reliability purposes, three gas-fired turbines are used for the Cogeneration Project each with a heat recovery steam generator (HRSG) that can provide steam directly to the Refinery or to the cogeneration unit's steam turbine. Having three gas turbines and HRSGs will ensure a continuous supply of steam and electricity to the Refinery, even if one gas turbine is off-line for maintenance and a second turbine shuts down unexpectedly.

2.2.2 Regional Power

The Pacific Northwest also needs additional electrical generating capacity. During 2000 and 2001, the region experienced highly volatile electricity prices as well as supply curtailments. Current forecasts indicate the potential for future electricity shortages and concerns about system reliability. Extraordinary short-term actions during 2001 helped to significantly reduce electricity demand. In particular, the shutdown of aluminum smelters reduced demand by approximately 3,150 MW, which helped alleviate the critical near term electricity shortage in the Northwest.

However, the construction of additional generation capacity is still needed to address long term demand for additional power. Many generation projects previously proposed for the region have been cancelled or put on hold, some even after construction has started.

2.2.3 Self Reliance

Currently, all of the electricity used at the Refinery, approximately 85 MW, is purchased from the Mid-Columbia power market and transmitted to the Refinery by Puget Sound Energy (PSE). PSE owns and operates the transmission line and associated facilities that supply purchased electricity to the Refinery. BP had previously considered obtaining power from the Bonneville Power Administration (BPA) system and BP obtained local and wetland permits to construct the transmission line to allow such a direct connection to the BPA system (COE permit number 1998-4-02349).

As a result of electrical supply shortages and resulting extremely high electricity costs, BP installed 14 small gas turbine generators as a stopgap measure. These generators operated in 2001, but were removed last year when power prices abated due to reduced electricity demand created by BPA Direct Service Industry contract buyouts and a regional recession. BP now intends to construct a more efficient cogeneration facility to mitigate the effects of any future electricity shortfalls.

2.2.4 Environmental Impacts

Electricity demand in the Puget Sound area is growing at a rate of 200 MW per year, and additional generation is required in this area to provide for voltage stability in BPA's

transmission system[1]. BP shares public concern over increased air emissions and use of water resources for power generation. For this reason, the Cogeneration Project is designed to allow offsetting reductions in emissions from the Refinery and to use water reuse to minimize the use of fresh water resources.

To address the need described above, BP is proposing a natural gas-fired Cogeneration Project on land adjacent to the Refinery. This project will be integrated with the Refinery to maximize the efficiency of power production, produce steam for the Refinery and to take advantage of the existing infrastructure at the site. Of the 720 MW of electricity produced by the project, 85 MW will be delivered to the Refinery, leaving 635 MW available for the northwest electrical grid. By providing electricity to the Refinery, the Cogeneration Project would enable the Refinery to eliminate its reliance on third-party sources of electricity, and would enable BP to decommission several older steam boilers at the Refinery.

2.3 Nature of Wetland Impacts

Wetland delineations were conducted on May 3-4, June 11, and August 6, 2001, and on January 22-23, 2002. After an informal review of the wetland delineation by regulatory agencies, including the Corps of Engineers, additional field verification of soil sample locations was conducted on October 7, 2002. The results of the field investigations determined that there is an extensive wetland system associated with the low-rolling glacial ground-moraine plains that lie within both the proposed plant site and construction staging areas (See Figure 1-2). This wetland system consists of a palustrine emergent wetland and a hydrologically connected forested area. Approximately 25 percent of the forested wetland exhibits wetland characteristics. As a result of the construction of the proposed Cogeneration Project, 35.37 acres of low value wetlands will be impacted.

The proposed project site, which is in an area immediately south of Grandview Road, contains patchwork emergent wetlands and an emergent wetland comprised primarily of planted hybrid poplars with an herbaceous understory. The wetlands that would be disturbed are low grade and have low functionality. A detailed account of the wetlands is given in a report entitled BP Cherry Point Wetland Delineation Report [Revised] (Golder Associates Inc., February 2003).

[1] "BPA Infrastructure Technical Review Committee Report" dated August 30,2001

3. ALTERNATIVES

3.1 No Action Alternative

Under the no action alternative, the Cogeneration Project would not be constructed. The Cogeneration Project's 720 MW of electricity would not be available to the Refinery, or the region. In addition, the existing, less efficient boilers would remain in place at the Refinery and new steam production would be required for other projects planned at the Refinery.

The North American Energy Reliability Council (NERC 2001) report states that long term adequacy of power supply will depend on how many of the currently proposed projects are permitted and constructed. It reports that near term (2001-2005) generation capacity is satisfactory, "*provided new generating facilities are constructed as anticipated.*" In addition, NERC reports that long-term adequacy is difficult to assess and is dependent on the continued response of independent power producers to respond to market forces by constructing new facilities and "*their ability to obtain the necessary siting and environmental approvals*".

If the Cogeneration Project is not built, another power plant will be built in the region that would likely be less efficient (non-cogeneration); not be able to take advantage of an existing infrastructure; and not provide corresponding expected on-site emission offsets similar to the proposed Cogeneration Project.

Under the no action alternative, the purpose and need of the proposed project would not be met as described below.

3.1.1 Self-Reliance

The Refinery would be supplied electricity either from PSE, through direct service from BPA (a transmission line for direct service was previously approved) or temporary on-site generators. None of these alternatives provides the Refinery with the assurance that long-term and cost-effective electrical energy can be supplied to the Refinery. The Refinery would also have to address long-term steam production without the efficiency advantages of Cogeneration.

3.1.2 Efficiency

Under the no action alternative, electricity and steam would continue to be supplied by separate sources, resulting in higher costs and less efficient use of energy resources. New electricity generation would likely come from stand-alone power plants in the region, which are less efficient than the Cogeneration Project.

3.1.3 Reliability

Under the no action alternative, the Refinery would be vulnerable to loss of electrical power from the PSE system, or from a lack of steam caused by future boiler outages. The PSE

system has been generally reliable, but electricity disruptions have occurred. The Refinery's boilers are becoming less reliable. Proposed Refinery projects to produce cleaner burning fuels would require additional steam and thus more boiler capacity. Under the no action alternative, the Refinery would have to address these issues through other capital investments that would not have the efficiency advantages of a cogeneration unit.

3.1.4 Impacts of the No Action Alternative

Under the no action alternative, electricity would be supplied to the region from existing and new generation sources. New generation is likely to take the form of gas-fired stand-alone power plants that would not be able to offset their criteria pollutant emissions with corresponding emissions reductions at a steam host, so a net increase in emissions would be likely to result. These plants would also likely be less efficient and therefore generate more carbon dioxide and other greenhouse gases per MWh of electricity produced. These new plants might also use significant fresh water resources for cooling purposes depending upon the design chosen.

Land Use

Under the no action alternative, the acreage impacted by the proposed Cogeneration Project would remain available for other BP uses. It may continue to be used as a buffer zone, or used for future industrial development.

Plants and Animals

There are no immediate plans to disturb the low-value wetlands at the proposed Cogeneration Project site and therefore no plans to restore or enhance wetland habitats north of Grandview Road. However, harvesting of the pulpwood trees or future use of the project site may impact the wetlands.

3.2 Project Site Location Alternative Selection Process

In addition to evaluating the proposed action versus the no action alternative, BP evaluated alternative sites for the Cogeneration Project based on the following criteria:

- Sufficient acreage available
- Proximity to the Refinery and site size
- Avoidance or minimization of wetland impacts
- Proximity to infrastructure (roads, pipelines, and transmission lines)
- Potential for other environmental impacts
- Security

These criteria are discussed in more detail below.

3.2.1 Sufficient Acreage Available

A site of approximately 33 acres is needed to provide for all plant components including a switchyard and other ancillary features. This acreage allows for some buffer around the perimeter of the plant. The actual footprint of the project could vary somewhat depending on final design of the project. In addition to the plant area, additional space of 36 acres is also needed for construction laydown, fabrication yards, and access roads. These areas temporarily will be used by the Cogeneration Project for approximately two years during the construction period and will be left in place for use by the Refinery thereafter.

3.2.2 Proximity to the Refinery

The proposed Cogeneration Project has to be located within a reasonable distance from the Refinery to provide steam through relatively short pipelines that are properly insulated for steam transport. Increasing the distance of the power plant from the Refinery would decrease the efficiency of the project or make it impractical. Additionally, increased pipeline length would result in increased disturbance to land and wetland areas. The project site has to take into account the delivery point of the steam at the Refinery, since Refinery operations or other obstacles may prevent a reasonable connection.

3.2.3 Avoidance of Impacts to Wetlands

Siting of the Cogeneration Project took into account the presence of wetlands; the potential area of wetlands that would be impacted; and, in some cases, the function and value of the wetlands. Alternative project configurations were also evaluated to reduce overall impacts. In addition, proposed future Refinery construction requirements were assessed to determine if there were potential actions that would result in additional wetland impacts. In the site alternatives described in Section 3.3, the acreage and type of impact and loss of wetland functions and benefits are described.

3.2.4 Proximity to Infrastructure

The operation of a gas-fired cogeneration plant depends on several elements of supporting infrastructure, including a natural gas pipeline, a source of water, road access, and a transmission line. Reducing the construction of new infrastructure lowers cost and reduces the impact on the environment. The Refinery has the above-mentioned infrastructure already in place, and the proposed site allows use of this existing infrastructure with minimum modifications. Alternative sites would require an extension of this infrastructure to service the Cogeneration Project.

A transmission line corridor has been permitted in a previous action, including mitigation for wetland impacts. To minimize additional wetland and other environmental impacts, all of the sites were evaluated in relationship to this permitted transmission line corridor. See Figure 1-4 for existing infrastructure

3.2.5 Avoidance of other Environmental Impacts

Impacts on other environmental values were also considered in the analysis of alternative sites, including loss of wooded areas, upland habitat impacts, proximity to water bodies and visual impacts.

3.2.6 Security

The Refinery is located in a rural area and is surrounded by wooded areas and open fields that are bisected by paved roads. BP owns much of the land immediately surrounding the Refinery industrial area, except on the west where the property boundary is along Jackson Road. A chain-link fence topped by barbed wire surrounds the Refinery, which is bounded on the north by Grandview Road, Jackson Road on the west, Blaine Road on the east, and Aldergrove road on the south. An internal security road runs inside the fence line. A secondary chain-link fenced area encloses other ancillary facilities east of Blaine Road and bounded by Grandview Road and Kickerville Road. Security guards patrol all roads and fence lines and all other BP properties.

The proposed Cogeneration Facility should be sited in a location where security can be maintained and interconnections to the Refinery and the electrical grid can be easily secured.

3.3 Alternative Project Sites

Five specific sites were evaluated for the power plant. In addition, several general areas within BP property boundaries and several off-site areas were evaluated. Site 3 is the preferred alternative. Table 1 summarizes the ratings for each evaluated alternative. See Figures 1-5 and 1-6 for site locations.

Table 1. Summary of Ratings of Alternative Cogeneration Facility Sites

Criterion	Alternative				
	Site 1	Site 2	Site 3 (Preferred)	Site 4	Site 5
Sufficient Acreage	H	L	H	H	M
Proximity to Refinery	M	H	M	L	H
Avoidance of Wetlands	L	H	M	M	M
Security	H	H	H	L	H
Proximity to Infrastructure	H	H	H	L	H
Avoidance of Other Environmental Impacts	H	H	H	L	M

Note: H = High (best meets criterion)
M = Medium
L = Low (does not meet or marginally meets criterion)

3.3.1 Site 1: Brown Road Site

Site 1 was the first site investigated for the Cogeneration Project. The site is located east of Blaine Road and north of Brown Road and adjacent to an existing cooling tower. In addition, it is in close proximity to the Refinery and proposed transmission line.

3.3.1.1 Sufficient Acreage

Site 1 has sufficient acreage and is rated high in this category.

3.3.1.2 Proximity to the Refinery

Site 1 is approximately 700 feet west of the Refinery and would require a minimal amount of pipeline for moving steam to the Refinery and providing the electrical connection. The pipeline runs to the Refinery would be in nearly a straight line. Construction of the Cogeneration Project at this location would not impact Refinery operations or increase health and safety risks for workers. This site rates high in meeting this criterion.

3.3.1.3 Avoidance of Impacts to Wetlands

Site 1 was delineated for wetlands and it was determined that the site is approximately 80 percent wetlands (30 acres). Although several different site plans were considered, the impact on wetlands, including forested wetlands, remained the same.

The dominant vegetation species reported within the herbaceous wetlands include reed-canary grass, tall fescue, bluegrass (*Poa* spp.), bentgrass, soft rush, baltic rush, red top, Himalayan blackberry, vetch, creeping buttercup, and small patches of hardstem bulrush. Homogeneous patches of spikerush were also observed in the southern portion of Wetland D, which would be almost entirely disturbed if Alternate Site 1 were chosen. More detailed information regarding the wetlands in the proposed project site can be found in two reports entitled *BP Cherry Point Wetland Delineation Report (Revised)*, and *BP Cherry Point Wetlands Functions and Values Assessment* (Golder Associates, Inc., 2003 and 2002). This

site is rated low in meeting the wetland criterion. Of all the sites investigated, this site had the greatest impact on wetlands.

3.3.1.4 Proximity to Infrastructure

This site is adjacent to most of the Refinery infrastructure including an existing electrical substation, water pipelines, access roads, and the proposed transmission line corridor. The existing natural gas pipeline would have to be extended from the metering station near the intersection of Brown Road and Grandview Road to the project site. The site rates high in meeting this criterion.

3.3.1.5 Avoidance of Other Environmental Impacts

The site primarily consists of fallow agricultural and pastoral fields. There is a road to the site from Brown Road that is partially overgrown with vegetation. It appears that a former homestead and an orchard may have existed on the upland corner of the site. There are several pear, apple and walnut trees surrounded by Himalayan blackberry (*Rubus discolor*) thickets just west of the abandoned road. Except for the former homestead, the area is unremarkable compared to adjacent areas and relative to other alternative sites. The site is also farther away from residences or other public locations so noise and visual impacts would be less. Site 1 ranked high in avoiding other environmental impacts.

3.3.1.6 Security

The proposed facility is within the secure area of the Refinery and is a significant distance from public access. Steam pipelines and transmission lines would also be within the secure area and not accessible to the public. The site ranks high in this criterion.

3.3.1.7 Summary

Although rating high in most criterion, this site was not selected due to greater impacts on wetlands compared to the proposed site.

3.3.2 Site 2: Refinery Site

Site 2 is located within the Refinery boundary fenceline in close proximity to Refinery components (see Figure 1-5).

3.3.2.1 Sufficient Acreage

Only 16 acres of space are available at this location. This site rates low because it does not provide sufficient acreage.

3.3.2.2 Proximity to the Refinery

Site 2 is located in very close proximity to the Refinery and would require short segments of pipeline to move steam to the Refinery. This site rates medium in meeting this criterion because it not directly adjacent to the Refinery.

3.3.2.3 Avoidance of Impacts to Wetlands

The site is currently impervious surface with a few small patches of upland grasses that have been severely disturbed. This site rates high in meeting this criterion.

3.3.2.4 Proximity to Infrastructure

Site 2 is close to most of the Refinery infrastructure, including an existing electrical substation, water pipelines, access roads, and the proposed transmission line corridor. The existing natural gas pipeline would have to be slightly extended from the metering station near the intersection of Blaine Road and Grandview Road to the project site. The site rates high in meeting this criterion.

3.3.2.5 Avoidance of Other Environmental Impacts

Because the site is highly industrialized and composed mostly of impervious surface area, this site rates high in meeting this criterion.

3.3.2.6 Security

Site 2 is directly adjacent to the Refinery and would be the most secure site. The site ranks high in this criterion.

3.3.2.7 Summary

This site was not selected or further evaluated because it does not meet the criterion for site size.

3.3.3 Site 3: (Proposed) Grandview & Blaine Road Site

Site 3 is located approximately 300 feet south of Grandview Road and 100 feet east of Blaine Road in an area that is primarily fallow agricultural fields with some Himalayan and evergreen blackberry thickets, hybrid poplars (for pulpwood) and some young Douglas-fir trees (planted in early 1990s). The area between the site and Grandview Road includes a mix of wetland and upland areas and some of this land is currently planted with hybrid poplar trees that are planned for pulpwood harvest when mature and subject to market conditions making such a harvest practical. Upland areas at this location would be used as access to the proposed plant, for construction laydown, and as a buffer between Grandview Road and the power plant. The proposed site is set back from these utility corridors and meets the Whatcom County zoning ordinance for industrial setbacks from public highways.

3.3.3.1 Sufficient Area

This site has over 40 acres to accommodate the power plant facility and other ancillary components. This site rates high in meeting this criterion.

3.3.3.2 Proximity to the Refinery

The proposed site is approximately 600 feet from the steam delivery point at the Refinery. Steam lines would exit the Cogeneration Project plant and cross Blaine Road directly into the Refinery. Construction of the cogeneration facility at this location would not impact Refinery operations or increase health and safety risks for workers. This site has a medium rating since it is not adjacent to the Refinery.

3.3.3.3 Avoidance of Impacts to Wetlands

Site 3 was delineated for wetlands and it was determined that the site was approximately 30% wetlands (12 acres). Several site plans were considered at this site to minimize wetland impacts while maintaining the appropriate alignment for steam, gas, and electricity transport to and from the site and the Refinery.

Several individual wetlands (A, B, C, and D) were identified within the proposed building footprint for this site. The dominant vegetation species reported within the herbaceous wetlands include reed-canary grass, tall fescue, bluegrass (*Poa* spp.), bentgrass, soft rush, baltic rush, red top, Himalayan blackberry, vetch, creeping buttercup, and small patches of hardstem bulrush. Homogeneous patches of spikerush were also observed in the southern portion of Wetland D. Creeping buttercup and baltic rush communities dominate wetlands within the northern portion of the property in Wetlands B, C, and D.

Wetland A, located immediately south of Grandview Road, consists of palustrine emergent wetlands with planted hybrid poplars that will eventually be harvested for pulpwood. See the *BP Cherry Point Wetland Delineation Report*, and *BP Cherry Point Wetlands Functions and Values Assessment* for details (Golder Associates, Inc., 2003, 2002). This site rates medium in avoiding wetlands.

3.3.3.4 Proximity to Infrastructure

Site 3 is located near Brown Road and Grandview Road, which would provide easy access to the site. It is also adjacent to the natural gas pipeline and the metering station so the length of any natural gas pipelines interconnection would be minimized. This site is also close to the Refinery fresh water supply line and adjacent to the previously permitted transmission line corridor. This site rates high in meeting this criterion.

3.3.3.5 Avoidance of Other Environmental Impacts

Site 3 primarily consists of fallow agricultural fields and planted hybrid poplar areas that are beginning to be invaded by Himalayan blackberry. The poplars patch is isolated and is not contiguous with high-quality habitat. The area is located adjacent to Grandview Road and is therefore an edge habitat to small mammalian species. It is not likely that larger mammals use this area extensively due to the lack of cover, low quality habitat, and the proximity to the road. The area was assessed for wildlife habitat and no priority species or habitats, with the exception of the wetlands, occur within the parcel. There will be some aesthetic and visual impacts as a result of the removal of hybrid poplar trees and other vegetation, but the existing views also include the Refinery. Once construction is completed, BP would plant

vegetation and trees to create a visual buffer between site 3 and Grandview road, and also on the northern portion of Laydown area 2. Site 3 ranked high in avoiding other environmental impacts.

3.3.3.6 Security

The site is within the secure area of the Refinery and has a significant buffer from public access areas such as Grandview Road. All infrastructure would be within the Refinery secure area. The site ranks high in this criterion.

3.3.3.7 Summary

This site was selected as the preferred alternative because relative to the other sites it met the size criteria; it is adjacent to most of the Refinery infrastructure; it has less or the same impacts on wetland as sites 1 and 5; and site security can be maintained.

3.3.4 Site 4: Grandview Road Site

Site 4 was evaluated because it contains moderately sized upland area adjacent to Grandview Road. It consists of approximately two acres of mixed forest and shrub habitat surrounded by old fields (emergent wetlands).

3.3.4.1 Sufficient Acreage

There is sufficient acreage (> 33 acres) at this site to accommodate the project, but because of setbacks from the road for security, county ordinances, and aesthetic buffers most of the upland area would not be available for construction of the power plant, resulting in significant wetland impacts. This site rates high in sufficient acreage to accommodate the power plant.

3.3.4.2 Proximity to the Refinery

Site 4 is located approximately 0.5-mile east of the Refinery on the north side of Grandview Road. This site would require significantly longer segments of piping to deliver steam to the Refinery and would also require a 0.5-mile new transmission line to the Refinery. The steam pipeline runs to the Refinery would be difficult to construct because existing gas and water pipelines and electrical transmission lines are south of Grandview Road. Construction of the cogeneration facility at this location would not likely impact Refinery operations. The site rates low in meeting this criterion.

3.3.4.3 Avoidance of Impacts to Wetlands

The site was not delineated, although, with the exception of the elevated upland habitat, the site is entirely surrounded by herbaceous wetlands. As described in the Wetland Mitigation Potential Report (URS Corporation, 2001), reconnaissance of the area indicates that the herbaceous wetlands within Site 4 are similar to those found within the proposed project site. Wetlands are palustrine emergent in classification and are dominated by plants that often

occur within wetland systems including reed-canary grass, bentgrass, redtop, and sweet-vernal grass. This site rates medium in meeting the wetland criterion.

3.3.4.4 Proximity to Infrastructure

This site location is 0.5 miles from the Refinery and the existing infrastructure, including the electrical substation, water pipelines, and access roads, and the proposed transmission line corridor. The existing natural gas pipeline would have to be extended from the metering station near north and under Grandview Road to the project site. Additional pipeline and transmission line extensions would be necessary, including a steam pipeline over Grandview Road to the Refinery and a transmission line over Grandview to the Refinery. The transmission line interconnection to the BPA system could go over Grandview Road and connect to the existing corridor or a new corridor paralleling the north side of Grandview could be constructed. The site rates low in meeting this criterion.

3.3.4.5 Avoidance of Other Environmental Impacts

The site primarily consists of fallow agricultural fields and an elevated upland knoll that is forested. This patch of forested upland most likely serves as relatively valuable wildlife habitat based on the presence of old-growth trees and dense understory. Although the patch is fragmented, the isolated nature of the patch most likely attracts numerous bird species, including raptors that may roost or perch on the site to observe the fallow fields for prey items. Additionally, the patch is located in an area that BP has dedicated to wetland and wildlife habitat enhancement and preservation.

The scenic and aesthetic values on the north side of Grandview Road are high. There are no existing residential or industrial buildings. The scenic view consists of ponds, fields, and emergent wetlands across an open area to a tree line. The primary use of the site and adjacent fields is for cattle grazing. Transmission lines and a steam pipeline would likely be constructed over Grandview Road further impacting aesthetics. Site 4 ranked low in avoiding other environmental impacts.

3.3.4.6 Security

Site 4 is on BP property, but it is not within the secured area of the Refinery and would require a greater effort to establish and maintain security. In addition, natural gas and steam pipelines and transmission lines would be more accessible to the public. Maintaining security for this infrastructure would be difficult. The site ranks low in this criterion.

3.3.4.7 Summary

Site 4 was not selected due to the distance from the Refinery that would result in new utility corridors to the Refinery. In addition, the new utility corridors would be less secure than other proposed sites.

3.3.5 Site 5: Contractor Parking Area

Site 5 is located within the Refinery boundary fenceline just south of Grandview Road and west of Blaine Road. This area is used for construction laydown and contractor parking during maintenance programs at the Refinery.

3.3.5.1 Sufficient Acreage

Site 5 consists of Laydown areas 1 and 2 and the existing contractor parking lot, which total approximately 30 acres. While not as large as the preferred site, depending on project configuration it is likely that Site 5 has enough area for the project, but not as much as other areas evaluated. It, therefore, rates medium in meeting this criterion.

3.3.5.2 Proximity to the Refinery

Site 5 is located within the fenceline of the Refinery and would require relatively short segments of piping to move steam to the Refinery. It, therefore, rates high in meeting this criterion

3.3.5.3 Avoidance of Impacts to Wetlands

Portions of Site 5 were delineated for wetlands, and a reconnaissance of the remaining area indicates that the overall site is approximately 80 percent wetlands (23.5 acres). Wetland areas are comprised of herbaceous vegetation, shrub-scrub willows, and planted hybrid poplars. Several small depressional patchwork wetlands occur that are composed primarily of willows and soft rush. There is a small forested area that is composed primarily of facultative tree and shrub species. There is evidence of inundation, and water-stained leaves occur within the leaf litter. The wetland delineation and function and value reports provide more information on wetlands.

If site 5 were chosen for the Project site, then site 3 would be required for equipment laydown areas and the wetland areas east of Blaine Road would be impacted. Site 5 would also impact wetland area I, which would not be impacted if, preferred site 3 is chosen for the project. Regardless of whether Site 3 or 5 were chosen for the preferred site the wetland acreage impacted would be approximately the same. This site rates medium in meeting the wetland criterion.

3.3.5.4 Proximity to Infrastructure

The site location is adjacent to most of the Refinery infrastructure including an existing electrical substation, water pipelines, access roads, and the proposed transmission line corridor. The existing natural gas pipeline would have to be extended from the metering station, near the intersection of Blaine Road and Grandview Road, to the project site. The site rates high in meeting this criterion.

3.3.5.5 Avoidance of Other Environmental Impacts

The site consists of grassland and areas with impervious surface area including gravel roads, a walking trail and a paved parking lot. The area is within the fenceline of the Refinery and

natural resource values are relatively low considering surrounding land uses. Site 5 is required as temporary construction laydown area by the Cogeneration Project. However, another project under development, the Clean Fuels Project, will be built in the space that is currently used as a maintenance laydown area, which means that additional maintenance laydown area would needed in the future.

Rather than develop Site 5 and then restore it, and then possibly develop it again for Refinery needs, it is proposed to develop it once and mitigate for the wetland impacts once. Another disadvantage of Site 5 is visual impacts. If Site 5 were selected for the project, an uninterrupted view of the Cogeneration project and the Refinery beyond would be visible from Grandview and Blaine roads. If Site 5 were used for a laydown area then BP would plant trees and restore wetland vegetation along the north portion of the laydown area, providing a visual buffer of the Refinery to the west and the Cogeneration Project to the east.

Stormwater discharge, noise, transportation, and other potential impacts would remain similar to the proposed action. Site 5 therefore ranked medium in avoiding other environmental impacts.

3.3.5.6 Security

The site is within the secure boundary of the Refinery and all infrastructure would also be within the secured area and inaccessible to the public. The site rates high in this criterion.

3.3.5.7 Summary

Site 5 was not selected as the preferred site because it would not have lesser the impact on wetlands as did Site 3 and it would make future Refinery operation and construction activities more difficult.

3.3.6 Other Locations Evaluated

In addition to the sites described above, reconnaissance surveys were made of other areas to determine their suitability. These additional areas are described below.

Approximately 200 acres south of Site 1 were evaluated for the presence of wetlands. The entire area south of Brown Road was evaluated in the field for wetlands and it is estimated that the site is approximately 90 percent wetlands, including high quality forested wetlands (acreage unknown). The site primarily consists of herbaceous wetlands with high-quality forested wetlands that comprise approximately 70 percent of the area. Additionally, there are several small pounded areas that appear to be ephemeral, but hold water for extended periods of time. Based on the mature nature of the trees found on this site, in addition to the observations of large mammal and raptor species, including red-tailed hawk, and wading species, including great blue heron, this area rates low in avoiding other environmental impacts and was eliminated from further consideration.

The area east of Sites 1 and 3 consists of forested wetlands that are of higher quality in regards to their value for functions such as sediment detention and general habitat suitability. This area was eliminated from consideration based on the higher quality of the habitat.

3.3.7 Other Locations

BP owns approximately 2,500 acres of property surrounding the Refinery. BP did not consider other locations because the primary purpose of the Cherry Point Cogeneration Project is to supply steam and electricity to the Refinery. Other locations would require more extensive infrastructure interconnections such as new corridors for steam pipelines, electrical connections and access roads; potentially impact more priority habitats; would significantly affect the efficiency of steam transmission to the Refinery; and would be less secure.

3.4 Alternative Construction Laydown Areas Evaluation Criteria

It is estimated that approximately 41 acres are needed for storage and assembly of facility equipment during the construction phases. However, because of the potential for additional impacts to wetland areas BP has limited the construction laydown area that is adjacent to the site to 36 acres. BP would permanently convert a portion of the Cogeneration Project laydown areas to provide permanent laydown area needed at the Refinery for future construction and Refinery turnarounds. The required laydown area for the Cogeneration Project does not have to be contiguous. However, areas near the proposed site are needed for fabrication of major equipment, while areas further away could be used for temporary storage of other materials and equipment.

Table 2 shows the construction laydown areas uses and approximate acreage required for each use during peak construction.

Table 2
Construction Laydown Uses and Acreage

Item	Estimated Acreage Requirement
Gas Turbines	4.5
Steam Turbine	1.5
HRSGs	12
Cooling Tower	1
Structural Backfill	3
Civil Materials	1.5
Structural Steel	3
Misc. Equipment	1
Piping Materials	3
Electrical Bulks	2
Electrical Cable	1
Receiving area	0.5
Warehouse	0.5
Small Construction Equipment	0.5
Trailer Complex	3
Craft Parking	3
Challenge to Minimize Area	-5
Total	**36**

In addition to areas evaluated for the proposed Cogeneration facility construction, several potential laydown areas were evaluated based on the following criteria:

- Proximity to the Proposed Plant Site
- Site Access
- Avoidance of Impacts to Wetlands
- Avoidance of Other Environmental Impacts

3.4.1 Proximity to the Proposed Plant Site

HRSG and other major components are constructed near the project site and then transported to the project site for final assembly. These components are large and require significant effort to move them to the construction site. The laydown areas used for HRSG's and other subassembly construction should be near the construction site to minimize transportation and reduce cost and construction time.

3.4.2 Site Access

Laydown areas must have access to rail, barge and vehicle traffic for delivery of equipment and materials. All laydown areas considered have suitable access to transportation and roads capable of handling equipment and materials required for the project.

3.4.3 Avoidance of Impacts to Wetlands

As with the project site, the construction laydown areas were evaluated for the presence of wetlands. The Cherry Point area has extensive wetland systems. Wetland impacts were minimized as much as possible. The evaluation of alternative sites for construction laydown areas involved additional reconnaissance of areas within and adjacent to BP property. Alternative construction laydown area orientations were analyzed to reduce the impact to wetlands. In the laydown area alternatives described below, the acreage and type of impact and loss of wetland functions and benefits are described.

3.4.4 Potential for other Environmental Impacts

Impacts on other environmental values were also considered in the evaluation of alternative construction laydown areas, including loss of wooded areas, upland habitats, and old fields.

3.5 Construction Laydown Alternative Areas

A summary of ratings for performance criteria for construction laydown area alternatives is given in Table 3.

Table 3. Summary of Ratings of Alternative Laydown Area Sites

	Alternative			
	Site 1 - Preferred Alternative			Site 2
Criterion	Area 1	Area 2	Area 3	
Proximity to Proposed Plant Site	H	H	L	L-M
Site Access	H	H	L	H
Avoidance of Wetlands	H	M	H	L
Avoidance of Other Environmental Impacts	H	H	H	H

Note: H = High (best meets criterion)
M = Medium
L = Low (does not meet or marginally meets criterion)

3.5.1 Laydown Site One

The proposed construction laydown site is divided into three different areas. Portions of these areas would be used for storage of equipment and facility components, as well as to fabricate components before they are transported to the project site. Other areas would be used for construction parking and contractors offices.

3.5.1.1 Area One of Preferred Alternative

The first area that would serve as a construction laydown area is directly north of the proposed project site, south and adjacent to Grandview Road (Figure 1-7). This area would most likely be used for construction management and planning offices. Some land may be used for temporary storage of components that have been preassembled at one of the other two areas within the preferred alternative locations for laydown.

3.5.1.1.1 Proximity to Proposed Plant Site

This site would be located approximately 70 feet north of the proposed Cogeneration Project plant. Transport of assembled components would be easily accomplished and therefore this site rates high in meeting this criterion.

3.5.1.1.2 Site Access

This site would likely be accessed from Grandview Road, although Brown Road may be used as an alternative access point, if necessary. Grandview Road is currently capable of handling wide and heavy loads, although a turnout would be needed to access the site. Brown Road would be improved to accommodate the size and weights of hauled facility components and construction equipment. This site rates high in meeting this criterion.

3.5.1.1.3 Avoidance of Impacts to Wetlands

This site was chosen because it is mostly upland (4.7 acres) with blackberry communities comprising the dominant species of plants. The wetland area within the site is approximately 0.2 acres and 0.04 percent of the proposed site. This site rates high in meeting this criterion. The wetland mitigation plan includes the potential to convert much of this upland area to wetlands after construction is complete.

3.5.1.1.4 Other Environmental Impacts

This site minimizes the impact to priority habitats, although old fields would be affected. The site is currently overrun by invasive blackberry thickets and a few young Douglas fir trees. The proximity to Grandview Road currently limits use by large mammal species. A preliminary assessment has indicated that this site does not serve as habitat for priority species. This site rates high in meeting this criterion during the construction period of the plant.

3.5.1.2 Area Two of Preferred Alternative

The second area within the preferred alternative laydown area is located within the primary boundaries of the BP Refinery. It is located within the same area as Site 5 of the plant site alternatives.

3.5.1.2.1 Proximity to the Proposed Plant Site

This site would be located approximately 800 feet west of the proposed plant site. This site rates high in meeting this criterion.

3.5.1.2.2 Site Access

It is likely that this site will be accessed from an existing gravel road (see Figures 1-7 and 1-8) from within the Refinery and from Blaine Road. A parking lot is already present within this area, so construction parking may be provided. An existing security gate on Blaine Road would likely be opened, when required, to allow access to Grandview Road from the staging site. This site rates high in meeting this criterion.

3.5.1.2.3 Avoid or Minimize Impacts to Wetlands

The site was delineated for wetlands. Approximately 6.1 acres of palustrine wetlands, consisting of herbaceous and shrub-scrub vegetation would be impacted by the proposed construction laydown at the site. A portion of the impacted wetlands contains planted hybrid poplars that would not likely be considered forested wetlands. An 8-acre parcel was eliminated from consideration for use at this site because it was found to contain approximately 80 percent wetlands. The wetlands were evaluated for functions and values and found generally to rate low in most functions that were assessed. A full account of the functions and values assessment of these wetlands can be found in the *BP Cherry Point Wetlands Functions and Values Assessment* (Golder Associates Inc., 2002). This site rates medium in meeting this criterion.

3.5.1.2.4 Other Environmental Impacts

Approximately 3.5 acres of this site are comprised of existing impervious surface area in the form of a parking lot and an access road. The remaining acreage, excluding the aforementioned wetland, contains disturbed upland grasses and invasive weedy species within an old field habitat (fallow agricultural fields). Because this area is fenced and located within the Refinery fenceline, impacts to wildlife species are not likely to be significant. A preliminary assessment of the area has indicated that it does not serve as habitat for priority species. This site rates high in meeting this criterion.

3.5.1.3 Area Three of the Preferred Alternative

This upland site occurs south of Aldergrove Road and east of Jackson Road (Figure 1-7). This area is across from the Refinery crude and product pipelines to the docks at Cherry Point. The site is located within a relatively remote area that does not currently have access to main roads around the perimeter of the Refinery. Although it is not the most optimal location, the site would not impact priority habitats, including wetlands. This site would only be used if the other areas cannot meet all of the laydown requirements for storage. This site would not be used for fabrication or other uses that would require immediate use at the construction site.

3.5.1.3.1 Proximity to Proposed Plant Site

This site is approximately 1.5 miles southwest of the proposed plant location. Based on the significant distance of this site in relation to the proposed plant location, this site would likely be used for storage of construction equipment and facility components to be used during later phases of construction. Components would likely be transported to one of the other preferred locations for assembly prior to transport to the Cogeneration Project construction site. This site rates low in meeting this criterion in comparison to other alternatives.

3.5.1.3.2 Site Access

As previously stated, this site is relatively remote and is not easily accessible. The pipeline corridor prohibits access from Jackson Road, so access would have to occur from the eastern side of the site. There is an existing overgrown, narrow paved road that could provide access if it were improved. Unless other access options are considered, this site rates low in meeting this criterion.

3.5.1.3.3 Avoid or Minimize Impacts to Wetlands

This area is completely upland and would avoid impacts to wetlands. This site rates high in meeting this criterion.

3.5.1.3.4 Other Environmental Impacts

This site has been disturbed, and large amounts of fill material were placed in this area as a result of previous excavation and construction activities at the Refinery (Bill Campin, pers. comm., October 2001). Although disturbed, evidence of large mammal use was observed in

the area including black bear, coyote, and mule deer scat. However, a preliminary assessment of the area has indicated that it does not serve as habitat for priority species. This site rates high in meeting this criterion.

3.5.2 Laydown Site Two

Approximately 20 to 30 acres south of Aldergrove Road and east of Jackson Road along the Refinery pipeline corridor were evaluated for priority habitats, including wetlands (Figure 1-7).

3.5.2.1 Proximity to the Proposed Plant Site

This site is approximately 1.5 miles southwest of the proposed plant site. This site rates low in meeting this criterion in comparison to other alternatives.

3.5.2.2 Site Access

This site could be accessed directly from Aldergrove Road if an adequate turnout were constructed that could handle maximum loads. This site rates high in meeting this criterion.

3.5.2.3 Avoidance of Impacts to Wetlands

Approximately 85 percent of this site contains herbaceous wetlands that extend into native forested wetlands. Additionally, two mudflats were observed that contained stands of cattail (*Typha latifolia*) and one great blue heron was observed foraging at the mudflat. Based on the occurrence of emergent wetlands and mudflats, this area rates low in meeting this criterion.

3.5.2.4 Other Environmental Impacts

Both the upland and wetland portions of this site are relatively disturbed. Evidence of large mammal use was observed, although, with the exception of wetlands, priority habitats do not occur at this site. This site rates high in meeting this criterion.

3.6 Cogeneration Project Design Alternatives

Impacts to the herbaceous wetlands at the proposed power plant site were minimized to the extent possible. Several different orientations of the plant layout were evaluated to determine the configuration that would impact the least amount of wetlands. Facility components were compressed into the smallest area possible to maintain efficiency and proper functioning of the facility.

Two project configurations were evaluated, air-cooling and water-cooling. In order to minimize the consumption of fresh water, BP's original application proposed to use an air-cooled condenser. In light of the availability of once-through cooling water from the Alcoa aluminum smelter, BP now proposes a water-cooled system that would use recycled industrial water. Although this change reduced the total footprint of the project, it has also

allowed the stormwater system detention pond to be moved into the fence line of the project site. This may result in a small reduction in wetlands impacted by the project.

Upland areas just south of Grandview Road were excluded from consideration for part of the project area based on the need for visual screening of the facility. In addition to maintaining a visual screen from the moderately-trafficked road, Whatcom County requires that for heavy industrial facilities, "all setbacks shall be increased by one foot for each foot of building height, excluding tanks and similar structures, which exceeds 50 feet" along major thoroughfares, including Grandview Road, State Route 548, (Whatcom County Municipal Code 20.80.254). HRSG stacks for the proposed power plant will be 150 feet tall and therefore will require 150 feet of setback. The setback requirement dictates how far north the plant site could be located.

4. REFERENCES

Listed below are references and sources of information for the Alternatives Analysis.

Bill Campin, pers. comm., BP West Coast Products, October 2001.

BPA Infrastructure Technical Review Committee Report, August 30,2001

Corps of Engineers, Memorandum to the Field, Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b)(1) Guidelines Alternative Analysis, August 23, 1993

Golder Associates Inc. BP Cherry Point Wetland Delineation Report [Revised], February 2003, Redmond, Washington

Golder Associates Inc. BP Cherry Point Wetland Functions and Values Assessment, June 2002, Redmond, Washington

Sumas Energy 2, Inc. Practicable Alternative Analysis for COE Permit No. 98-4-02021, March 20, 2000, Kirkland, Washington

Western Systems Coordinating Council, August 2001,10-year Coordinated Plan Summary 2001 – 2010, Salt Lake City, Utah

FIGURES